

CHAPTER VI

CONCLUSION

Some flowers have been used as food and for medicinal purpose for centuries. From this point of view, the results presented here could be considered as the first information on the cytotoxicity using brine shrimp assay. The brine shrimp lethality assay is correlated with cytotoxic of the flowers. It is demonstrated that flower extracts showed the high LC_{50} values which attributed to low amount of cytogenic and toxic compounds.

The present investigation suggested that none of flower extracts was mutagenic in Ames test without metabolic activation and somatic mutation and recombination in *Drosophila*. In Ames test, all nitrite treated flower extracts, except of those of dichloromethane extracts of red hibiscus, white frangipani, malay apple, methanol extract of malay apple and water extract of red hibiscus, were mutagenic on *S. typhimurium* TA 98 and TA 100. All the dichloromethane extract of flowers decreased the mutagenicity of the reaction mixture of 1-aminopyrene nitrite model on both tester strains. Methanol extract of kra chiew and pomegranate showed the highest antimutagenic activity in TA 98 and TA 100, respectively at high concentration. It is hypothesized that the antimutagenicity of the extracts of flowers may be due to their flavonoids since Edenharder and Tang (1997) reported that 1-nitropyrene was in general more effectively antagonized by potent antimutagenic flavonoids. Working with the *Drosophila*, it was found that water extract of ixora showed the strongest antimutagenic activity in this study. In addition, it showed high antioxidant activity (FRAP assay) and high total phenolic content. The antimutagenic activity of flower extracts may involve the inhibition of the catalytic activities of phase I or inductions of phase II detoxifying in *Drosophila*.

Antimutagenic potential of flower extracts might be due to the presence of antioxidant activity and phenolic content. Results obtained from the natural sources can be used in food industries for preservation and/or extension of the shelf-life of raw and processed foods. The results in the present study also support the use of ixora, pomegranate, thong pun chang or Mexican creeper as additives in foods, and

traditional for anti-aging remedies. The research for antimutagenic agents is an important one, since mutagenic and carcinogenic factors are omnipresent in the human environment and elimination of all of them seems to be impossible (DeFlora and Ramel, 1988). The enzymes responsible for the activation of the promutagens are present in different cells of mammals and that activation happens frequently (Goldstein and Faletto, 1993) and, in many cases, even a very low exposure to the mutagenic agent may be enough to induce a genotoxic effect.

Therefore, consumer can take these flowers along with other diets in order to counteract the adverse effect of some mutagens occurred either during food preparation or from nature. Pomegranate, thong pun chang and Indian cork tree flowers can develop to fortify in folklore foods and should be promoted for daily consumption. Precaution, edible flowers such as Mexican creeper, ixora, kra chiew, sacred lotus, Indian cork tree, thong pun chang and pomegranate should be aware when they take with nitrite containing foods.

Further Study

The results obtained from this study encourage further investigation to identify and to isolate the chemical compounds presents in flower extracts, as well as to try and elucidate the mechanism involved in the antimutagenic activity. Water extract of ixora flower showed the highest antimutagenicity. It might possibly be due to flavonoids that Subramanian and Nair (1971) identified as cyanidin-3-rutinoside and leucocyanidin glycoside.

Further experiments are needed to reveal which components of extract of flowers are of particular antimutagenic potential.